User's Manual

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MADE IN TAIWAN

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1. Introduction

The UD-731 is a GPS USB Dongle and it is optimized for good performance and low cost. Its 65 parallel channels and Venus 6 search bins provide short start-up time and fast signal acquisition. Having fast time-to-first-fix and high sensitivity, the UD-731 offers good navigation performance even in urban canyons.

The UD-731 is capable of keeping up to 1Mega bytes records or positions, including longitude, latitude, speed, UTC and tag data. The location histories can be exported to mapping software such as Google Earth.

It is compact and easily used with your laptop or mini notebook.

2. Package Contents

UD-731 …….. x 1

CD-ROM ……x 1

3. System Requirements

The UD-731requires the minimum to run on a laptop:

Operating System: Windows 2000 / XP/Vista

CPU: 500 MHz, Pentium III

System Memory: 128MB RAM

Hard Disk: 50MB free space

4. Features

- ✓ 65 channel to acquire and track satellites simultaneously
- ✓ Capable of keeping up to 1 Mega byte Data logger (Longitude, Latitude, Speed, UTC….)
- ✓ Industry-leading TTFF speed
- ✓ Signal detection better than -158 dBm
- ✓ SBAS (WAAS/EGNOS) capable
- ✓ Cold start < 45seconds
- ✓ Hot start < 1second
- ✓ USB Interface
- ✓ Accuracy 5m CEP
- ✓ Easy-plug-in Notebook
- ✓ RoHS compliance

5. Specifications

5.1 Electronic Characteristics

Parameter	Specification
Receiver Type	65 channels
Re-acquisition sensitivity	-155dBm
Tracking sensitivity	-158dBm
Cold start sensitivity	-137dBm
Receiver frequency	1575.42MHz
Code	C/A code
Accuracy (1) Position (2) Velocity	 5m CEP 0.1m/sec
Startup Time hot start warm start cold start	 < 1 sec < 35 sec < 45 sec
Signal Reacquisition	<1s
Update Rate	1Hz
Operational Limits (1) Altitude (2) velocity	 < 18,000m < 500m/s
Dynamics	4G (39.2m/sec^2)
Datum	WGS-84
Protocol	NMEA-0183 V3.01
Serial Interface	USB interface
Input Voltage	5V ±5%
Power Consumption	180mW
Connector	USB B-type 4P male
Data Logger	Log 1 Mega byte flash memory(8M Bits). Data: Longitude, Latitude, Speed, UTC. Format:WGS84

5.2 Physical Characteristics

Parameter	Specification
Physical dimension	78.62mm X 24.83mm X 11.15mm
Weight	22+-10%g

6. Getting Started

There are only a few simple steps that you need to follow before using your UD-731:

- ◆ Install the USB driver onto your laptop using the included CD-ROM .
- ◆ Plug the GPS receiver into your laptop's USB port.

NOTE: From within your mapping or navigation software (including the supplied GPS Information utility), you will need to manually configure the COM port that was assigned to the UD-731 GPS receiver so that proper communication between the GPS receiver and a mapping program can occur. Most software requires that you manually configure the COM port setting for any GPS device being used.

1. You must change the default baud rate setting of your mapping software's Baud Rate to 4800, if this is not set then the GPS data cannot be received.
2. Set Baud Rate 4800, Data Bit: 8, Parity: None, Stop Bit: 1, Flow Control: None

6.1 LED Status

The LED flash status:

1. 1 second on/ 1 second off : GPS tracked
2. 1 second on/ 2 seconds off : while tracking

7. Software Installation

7.1 Overview

USB Driver is necessary software which allows you to operate UD-731 on your computer properly once the device is connected with the computer. USB Driver is different depending on your operating system you connect to. Therefore, when you connect UD-731 with your computer, you need to install an appropriate driver for the UD-731 beforehand. Once you installed the driver properly, you do not need to install again from the next time.

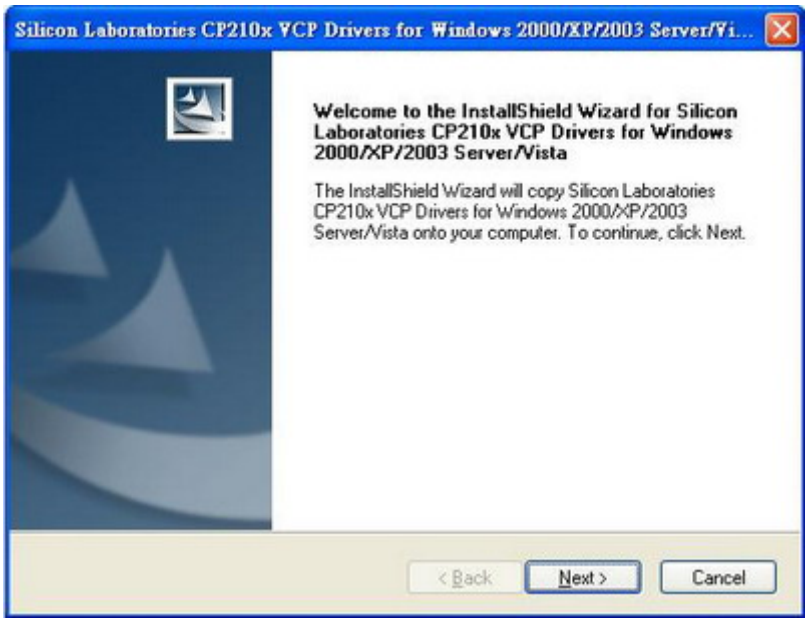
GPSView is multipurpose GPS utility. Please note that GPSView uses specific NMEA sentences to display data graphically. For more information on NMEA, please see the appendix 1. GPSView is a general purpose utility for monitoring the output of a GPS receiver. Using the NMEA data from the GPS receiver, GPSView will display various statuses for evaluating GPS which including latitude, longitude, altitude, speed, azimuth, fix mode and TTFF time. And also can be used to upgrade UniTraQ flash version GPS receiver.

7.2 Install USB Driver

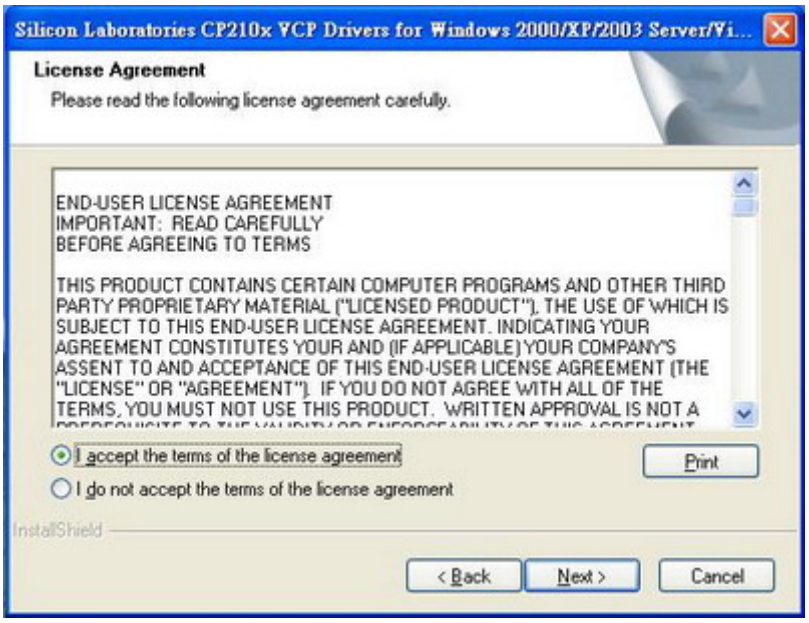
You need to prepare a PC to install USB driver. The USB driver category depending on your operating system and then please follow the procedure illustrated below to install USB driver. Please note this procedure is only for windows XP.

A. Insert the CD into your CD-ROM disk. The installation program should automatically run. If, the installation program does not initiate, double-click on GPS-Installation.EXE in the root folder on the CD-ROM. When the main menu appears on the screen, just click on USB-Driver for XP. If your operating system is vista, please click on USB-Driver for vista. The installation will begin, and then the install wizard will navigate you to finish installation.

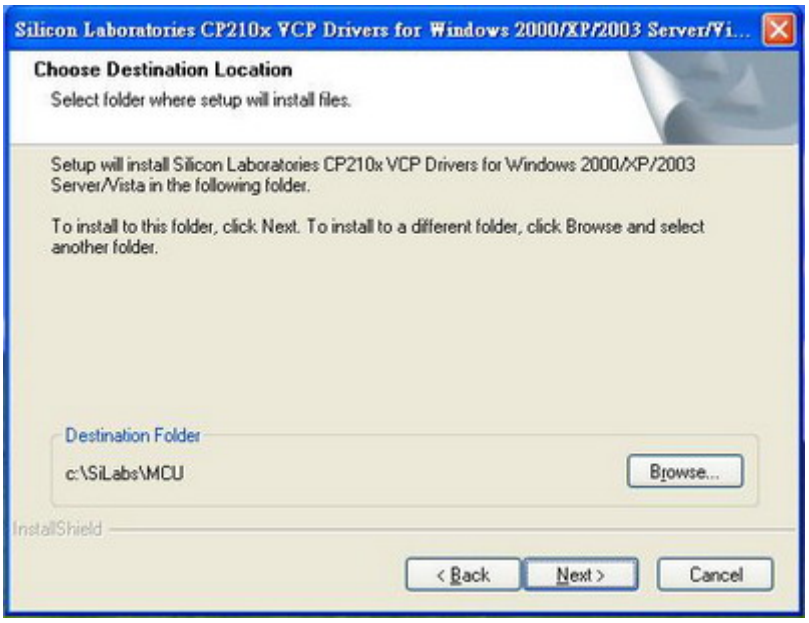
B. Click on Next on the installation welcome dialogue to continue.


Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vi...
Welcome to the InstallShield Wizard for Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vista
The InstallShield Wizard will copy Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vista onto your computer. To continue, click Next.
< Back
Next >
Cancel

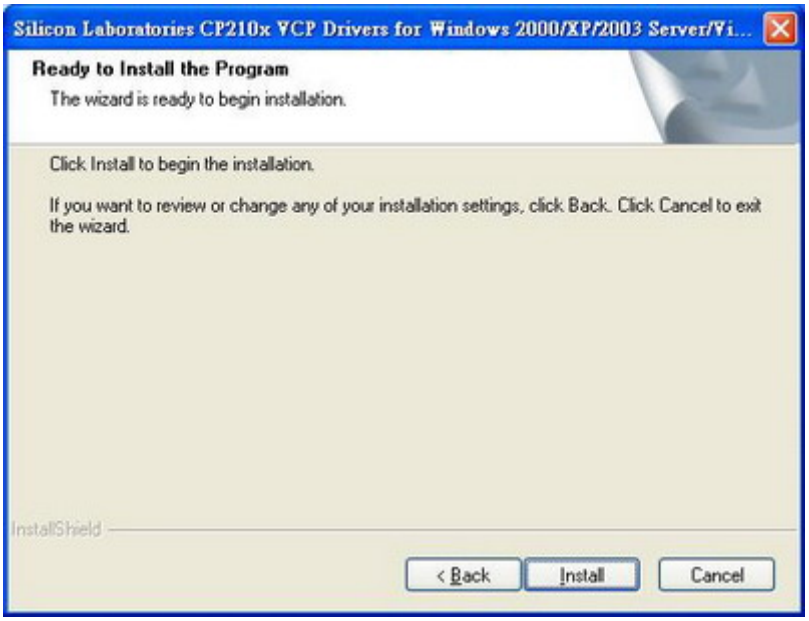
C. eview the license agreement information, and select I accept to accept the licensing terms, and then click on Next to continue. You may click on Back to go to the previous step, or Cancel to quit.


Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vi...
License Agreement
Please read the following license agreement carefully.
END-USER LICENSE AGREEMENT
IMPORTANT: READ CAREFULLY
BEFORE AGREEING TO TERMS
THIS PRODUCT CONTAINS CERTAIN COMPUTER PROGRAMS AND OTHER THIRD PARTY PROPRIETARY MATERIAL ("LICENSED PRODUCT"). THE USE OF WHICH IS SUBJECT TO THIS END-USER LICENSE AGREEMENT. INDICATING YOUR AGREEMENT CONSTITUTES YOUR AND (IF APPLICABLE) YOUR COMPANY'S ASSENT TO AND ACCEPTANCE OF THIS END-USER LICENSE AGREEMENT (THE "LICENSE" OR "AGREEMENT"). IF YOU DO NOT AGREE WITH ALL OF THE TERMS, YOU MUST NOT USE THIS PRODUCT. WRITTEN APPROVAL IS NOT A
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

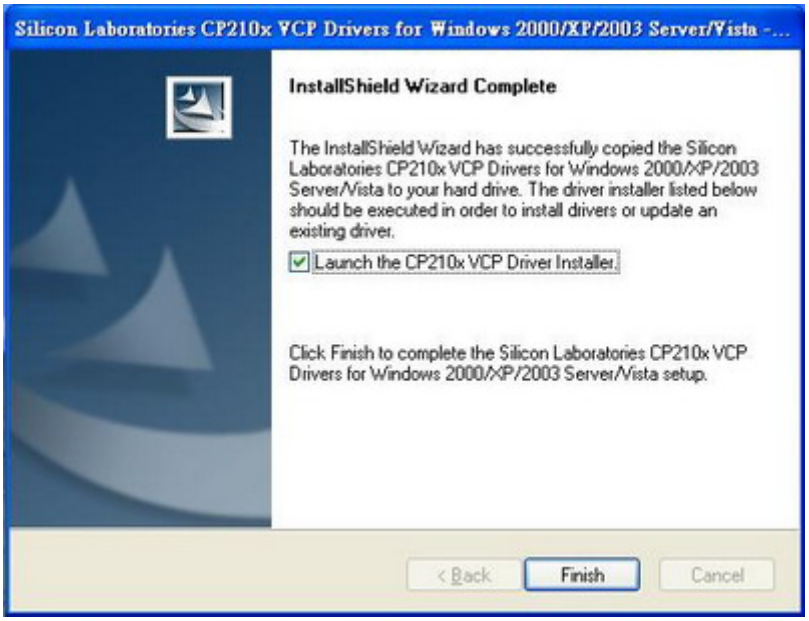
D. At this point the Installation allows you to change destination folder of CP210X VCP Drive for XP, if you have a specific reason for doing so. Click on Next to continue. If you want to install to a different folder, click on Browse. You may click on Back to go to the previous step, and click on Cancel to quit.


Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vi...
Choose Destination Location
Select folder where setup will install files.
Setup will install Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vista in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
c:\SiLabs\MCU
Browse...
InstallShield
< Back
Next >
Cancel

E. On the next dialogue, click on Install to start installation CP210X VCP drive. You may click on Back to go to the previous step, and click on Cancel to quit.


Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vi...
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

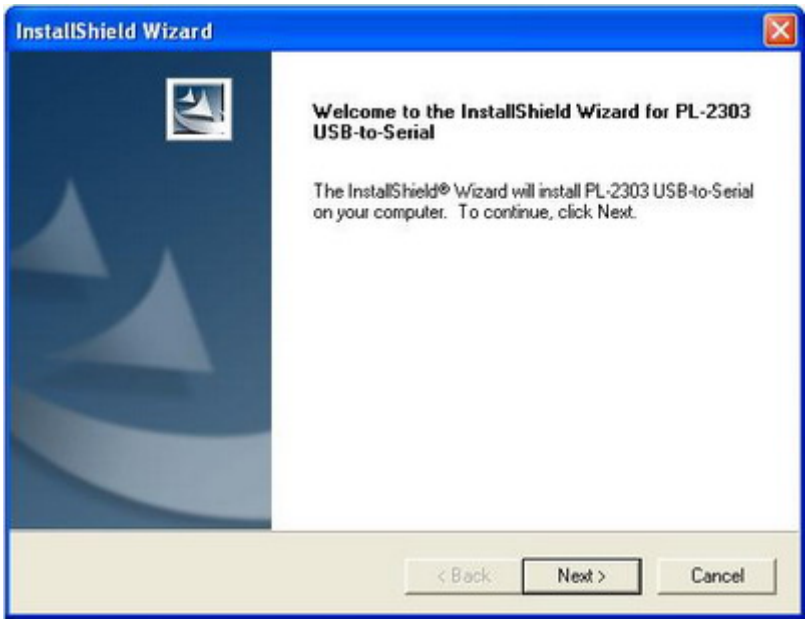
F. Wait for a few seconds while installation is copying files to your computer. Select Launch the CP210X VCP Driver installer and then click on Finish to complete the laboratories CP210X VCP driver installation.


Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vista -...
InstallShield Wizard Complete
The InstallShield Wizard has successfully copied the Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vista to your hard drive. The driver installer listed below should be executed in order to install drivers or update an existing driver.
Launch the CP210x VCP Driver Installer.
Click Finish to complete the Silicon Laboratories CP210x VCP Drivers for Windows 2000/XP/2003 Server/Vista setup.
< Back
Finish
Cancel

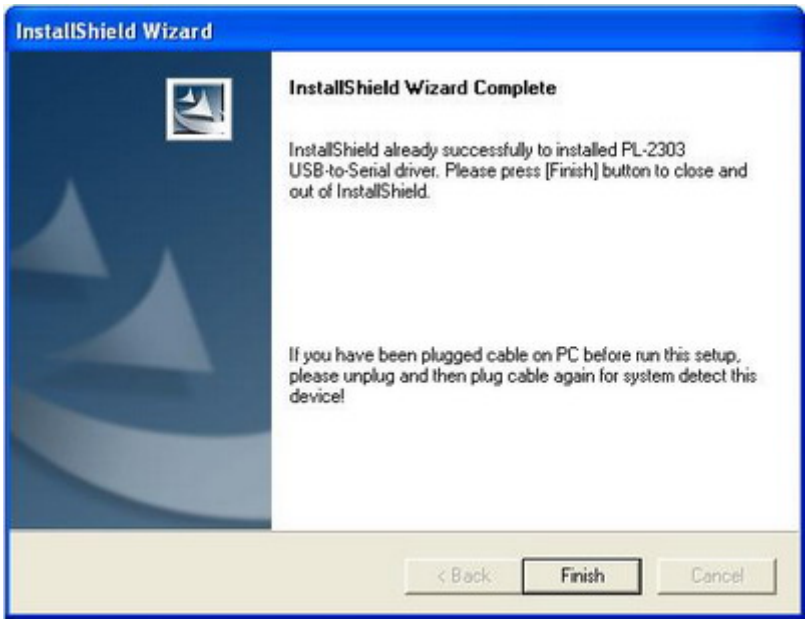
G. On the next dialogue, click on Install to start installation CP210X USB to UART bridge driver. If you want to install to a different folder, click on Change install location, and click on Cancel to quit.

H. Wait for a few seconds while installation is copying files to your computer. Click on OK to complete the laboratories USB to UART bridge driver installation.

I. Click on Next on the installation welcome dialogue to continue.


InstallShield Wizard
Welcome to the InstallShield Wizard for PL-2303 USB-to-Serial
The InstallShield® Wizard will install PL-2303 USB-to-Serial on your computer. To continue, click Next.
< Back
Next >
Cancel

J. Wait for a few seconds while installation is copying files to your computer. Click on Finish to complete the PL2303 USB-to-serial driver installation.


InstallShield Wizard
InstallShield Wizard Complete
InstallShield already successfully to installed PL-2303 USB-to-Serial driver. Please press [Finish] button to close and out of InstallShield.
If you have been plugged cable on PC before run this setup, please unplug and then plug cable again for system detect this device!
< Back
Finish
Cancel

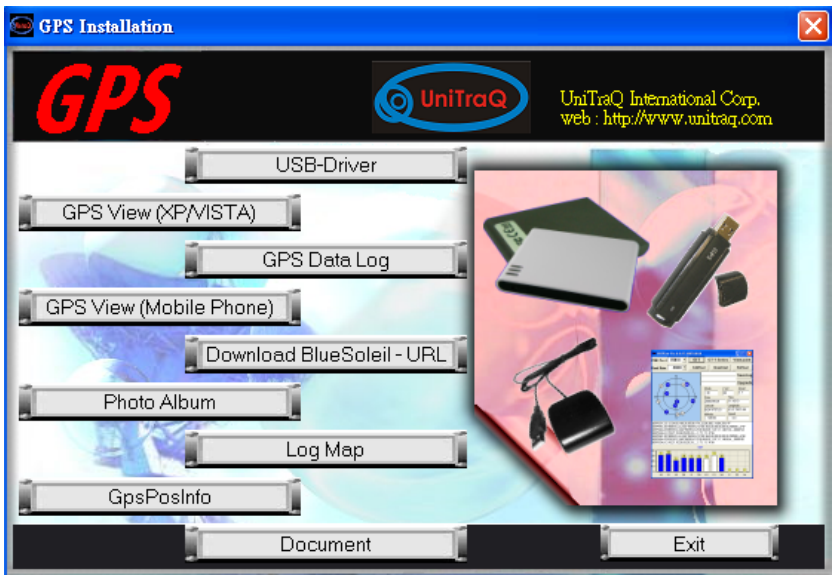
7.3 Install GPSView

You need to prepare a PC to install GPSView. The GPSView category depending on your operating system and then please follow the procedure illustrated below to install GPSView.

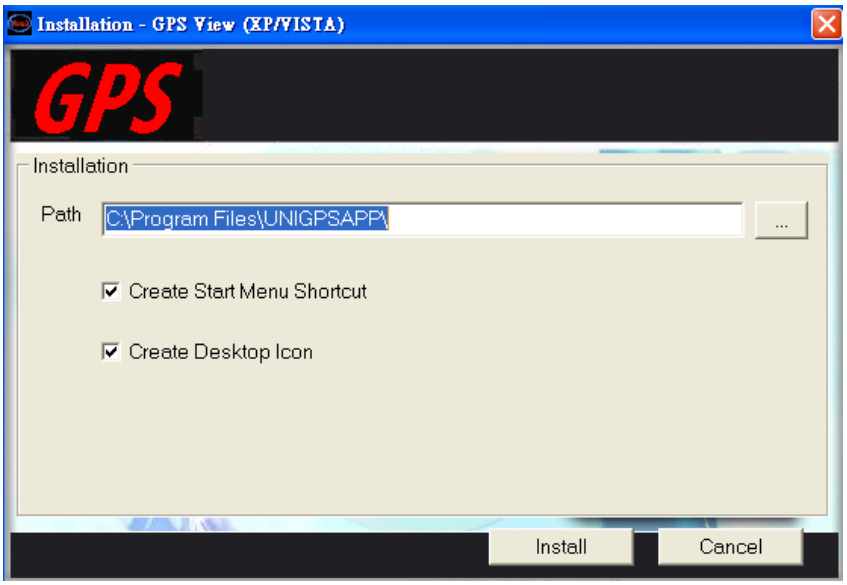
7.3.1 Install GPSView onto Windows 2000/XP or Vista

A. Insert the CD into your CD-ROM disk. The installation program should automatically run. If, the installation program does not initiate, double-click on GPS-Installation.EXE in the root folder on the CD-ROM. When the main menu appears on the screen, just click on GPS View (XP/Vista). The installation will begin, and then the install wizard will navigate you to finish installation.

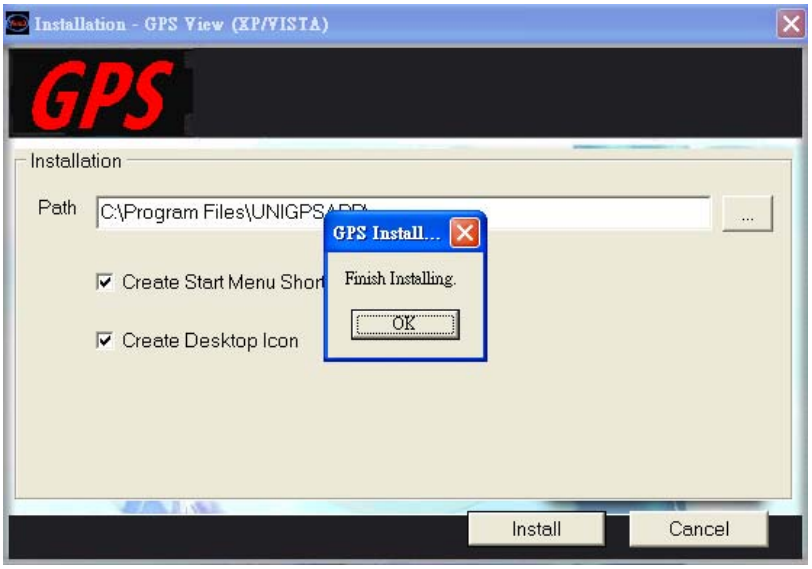
B. Click on GPS View(XP/VISTA) on the installation welcome dialogue to continue.



C. Click on Install to continue. You may click on Cancel to quit.



D. Click on OK to complete the installation.



E. You can find a Server icon from Start→Programs→UNIGPSAPP→gps-view2008.2, or from C:\Program Files\UNIGPS APP\GPSView\gps-view2008.2.exe. Click on the icon to run GPSView in your computer.

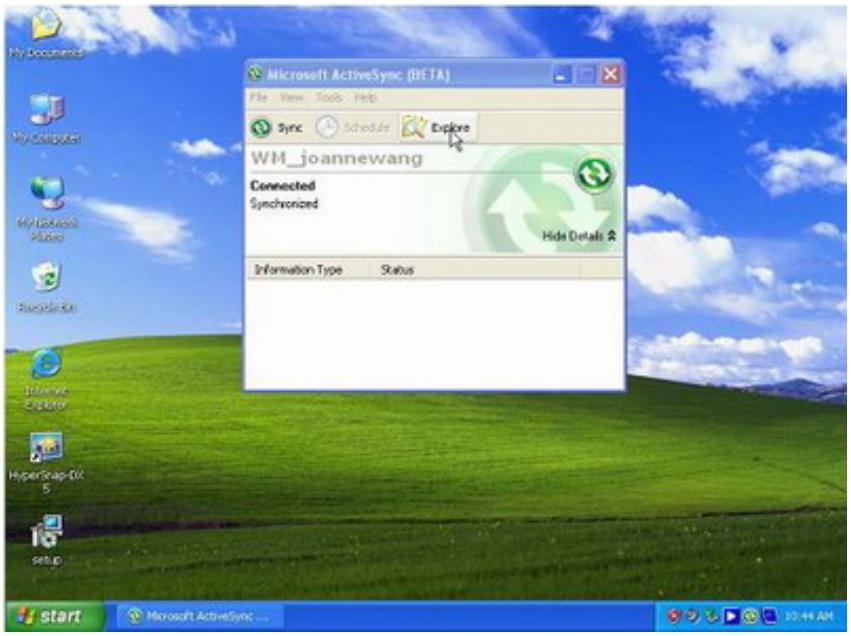
7.3.2 Install GPSView onto Pocket PC

A. Link to the following Microsoft web-site for downloading Microsoft ActiveSync.
http://www.microsoft.com/windowsmobile/en-us/help/synchronize/activesync45.mspx

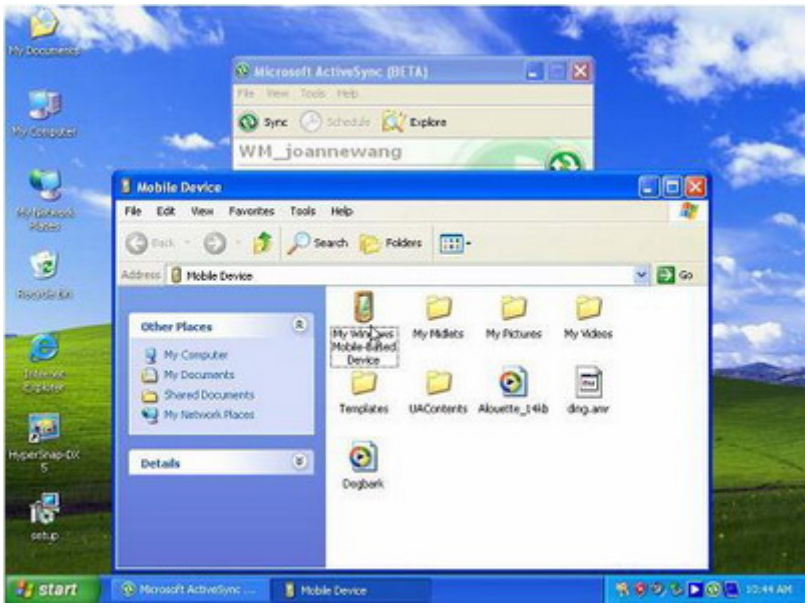
B. Install Microsoft ActiveSync onto PC.

C. Connect cradle to PC, and then the ActiveSync should create access between the PC and pocket PC.

D. Double click on ActiveSync icon, main menu appears on the screen as blow. And then Click Explore on the pop-up menu.



E. Select My Windows Mobile-Based Device on the dialog.



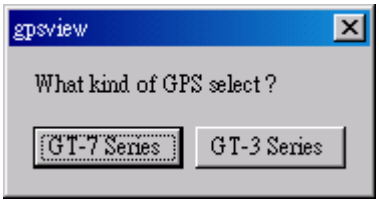
F. Determine the desired destination folder you want. In this example, the GPSViwe will be put on Storage Card.

G. Copy GPSViwe-P.exe form CD-ROM to your pocket PC. The GPSViwe-P.exe path is on the CD-ROM→ GPS-Installation→PDA. And please note that CD shall be inserted to CD-ROM disk.

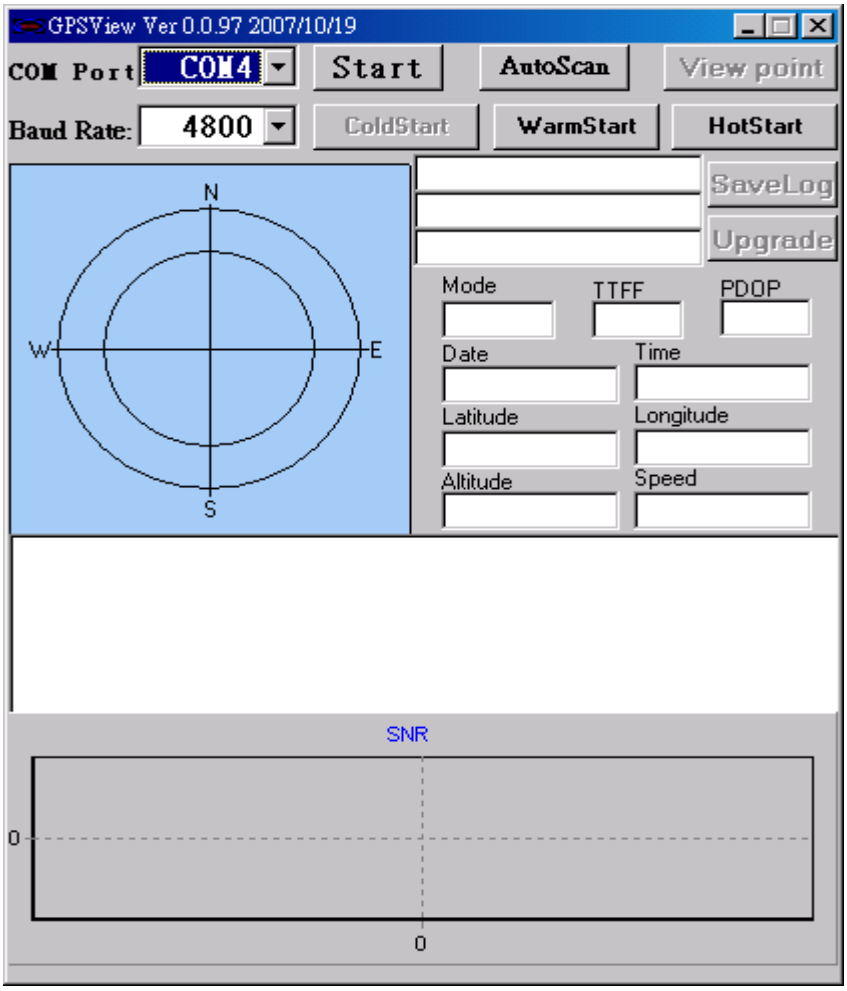
8. Application Software Introduction

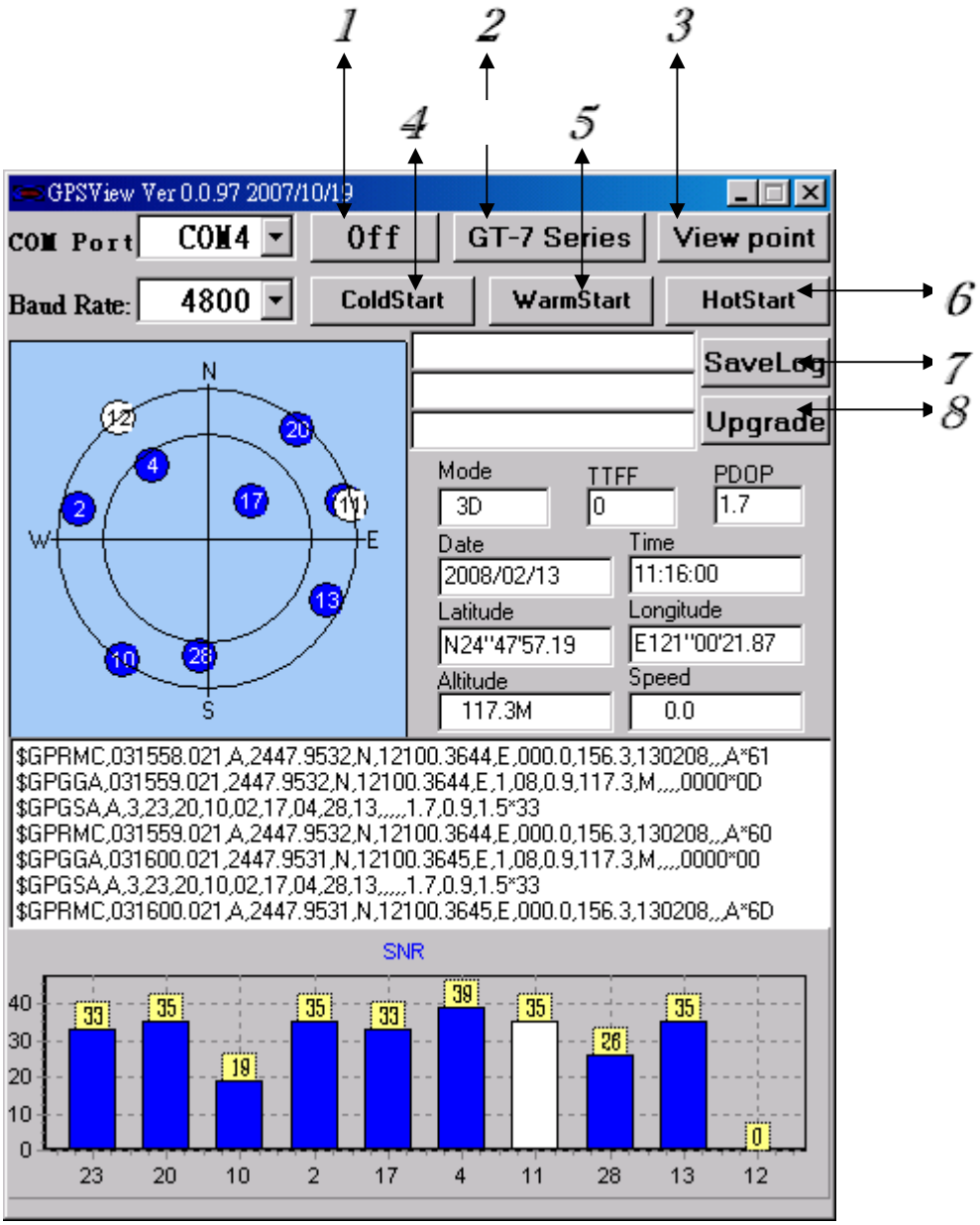
8.1 GPSView

Double Click on the gpsview.exe. and



Click on the GT-7 Series. Enter the Window below.



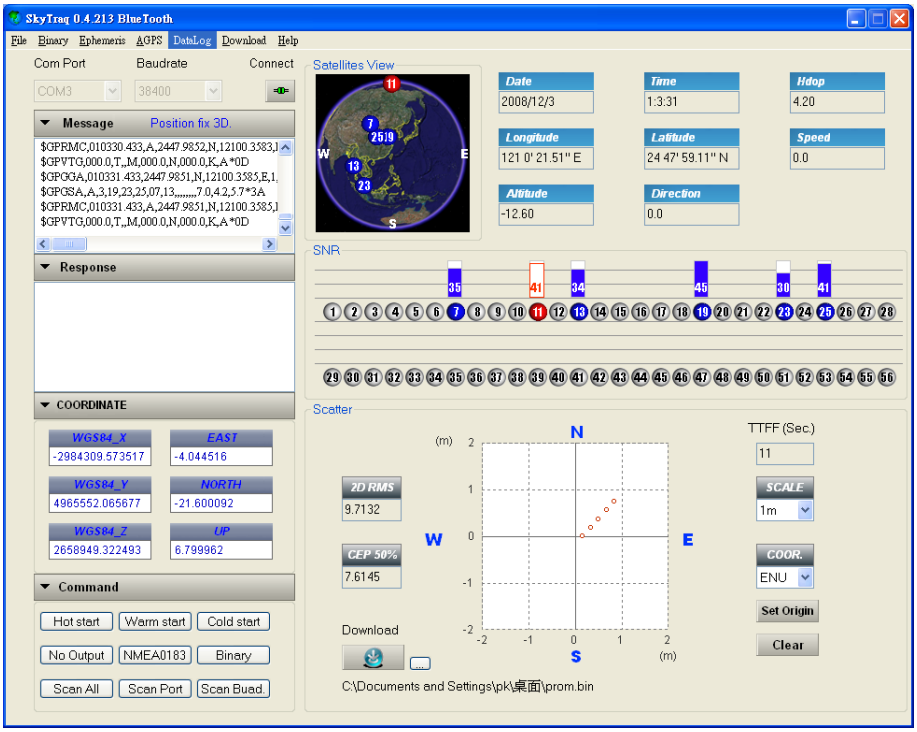


1. Off the GPS connection
2. Series Selection
3. Open Position Coordinate Window
4. Execute Cold Start
5. Execute Warm Start
6. Execute Hot Start
7. Save NMEA Data (Automatically save in the same Program file)
8. Upgrade Firmware (If upgrading Firmware, save it in the same Program file)

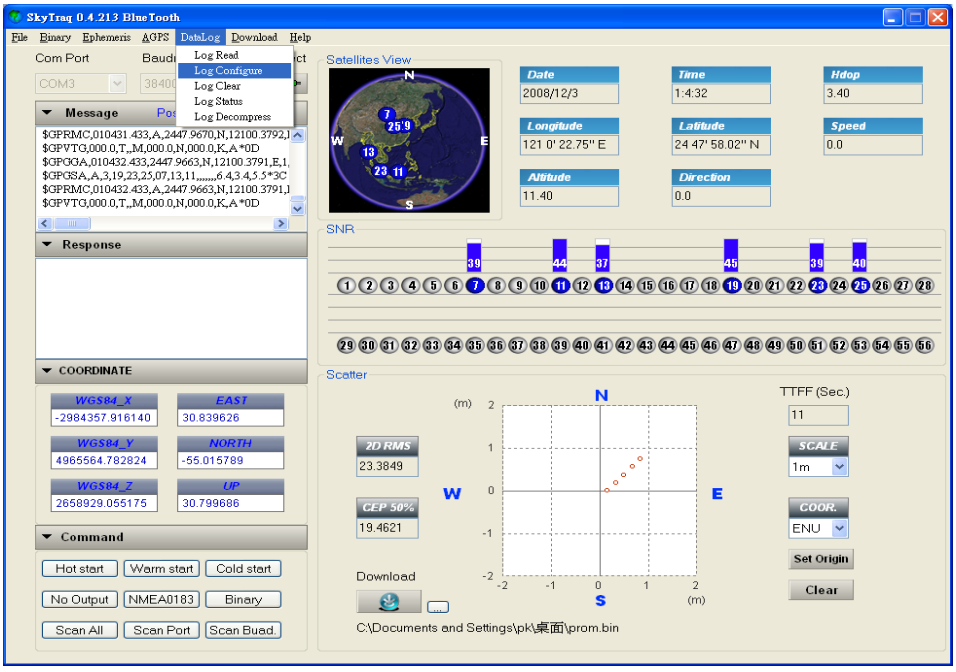
8.2 Data log

8.2.1 Set up Data Log

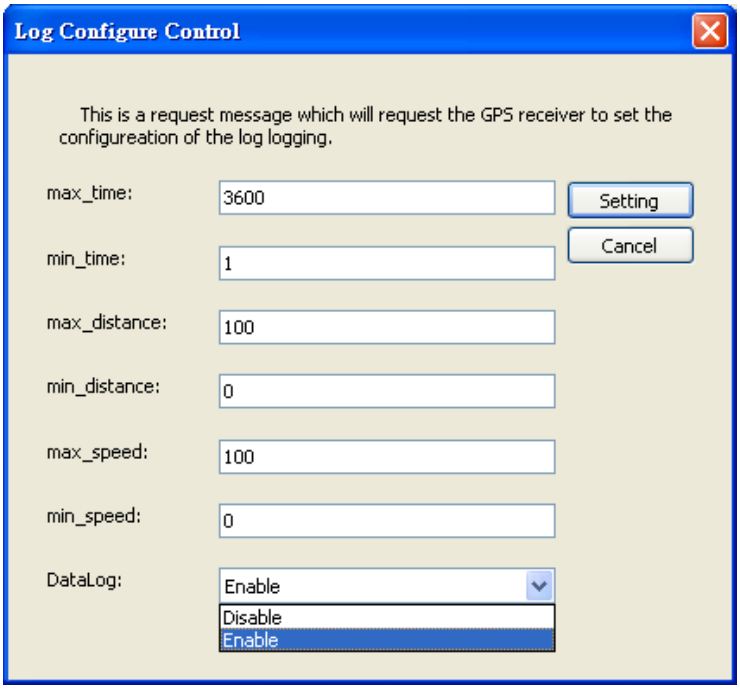
1. Execute Data log.exe.



2. Select “DataLog → Log Configure”

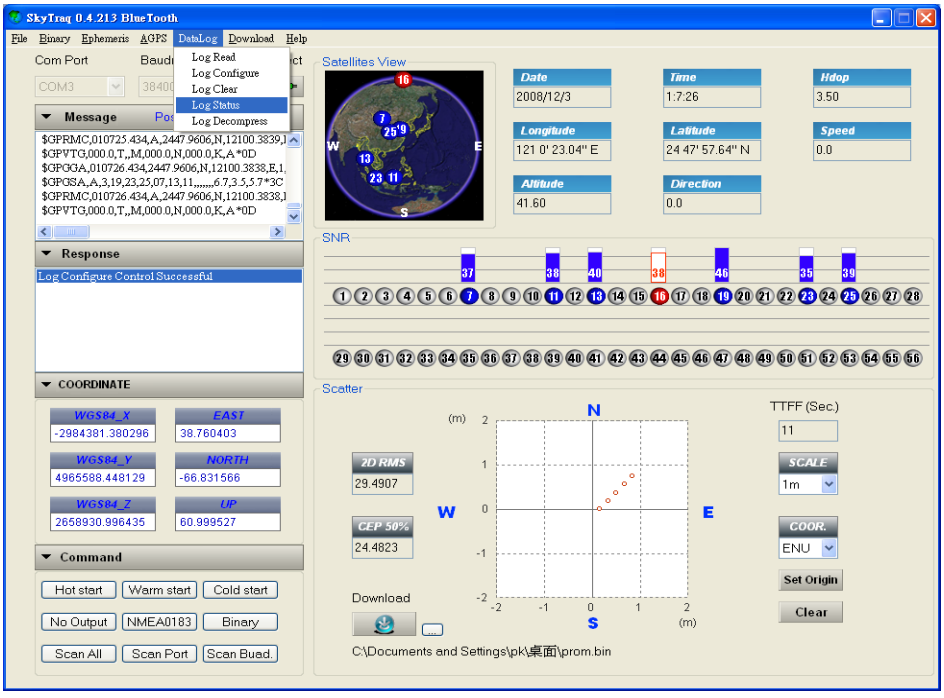


3. Configure your favorite log time “min_time” (by seconds) and “Enable” the Data log.

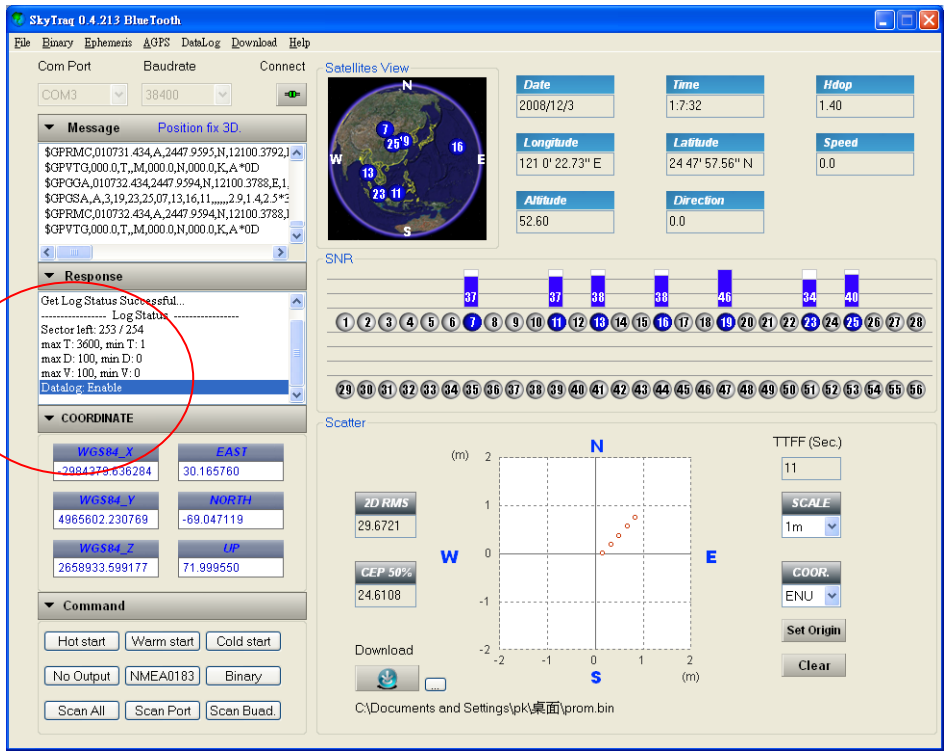


8.2.2 Check the status of configure

1. Select “DataLog →Log Status”

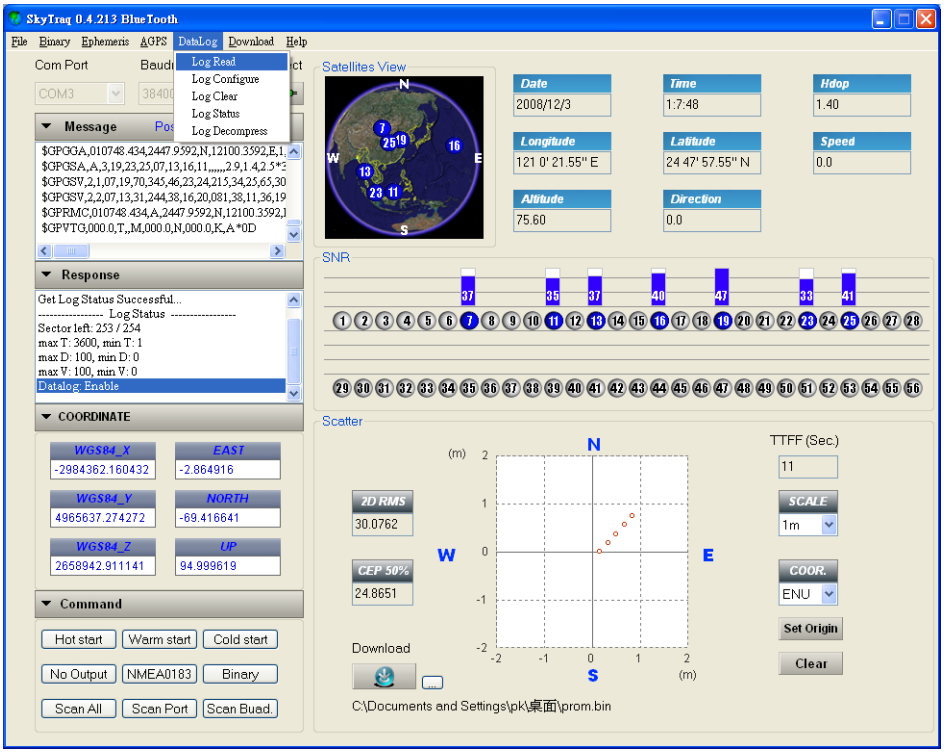


2. The window of “Response” will display the above configured status.

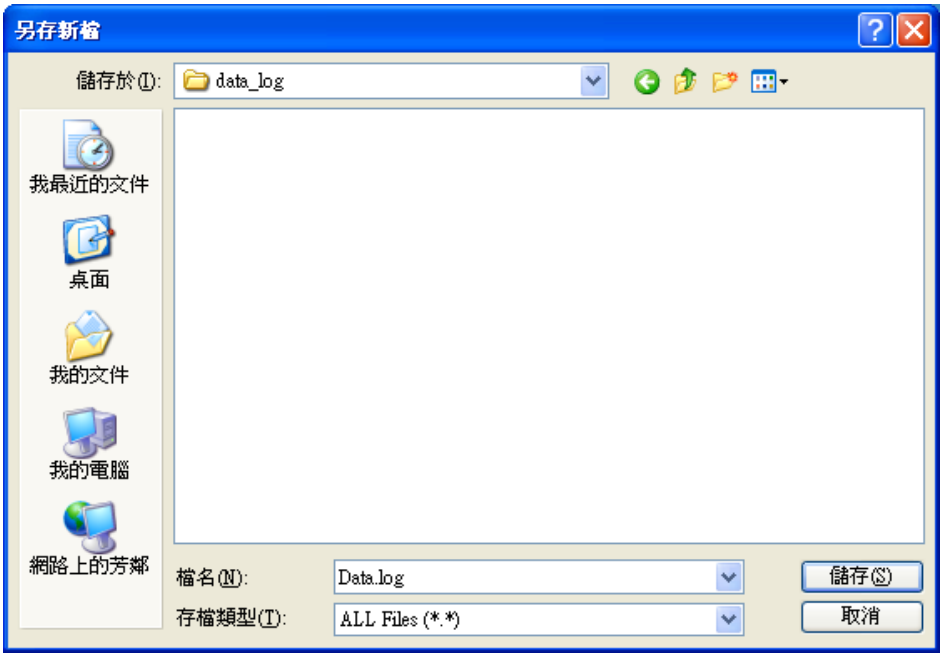


8.2.3 Retrieve the content of Data Log

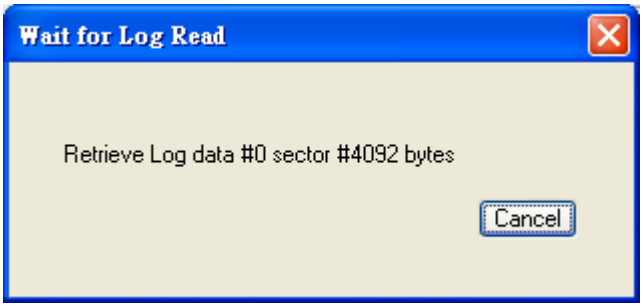
1. Select “DataLog →Log Read”



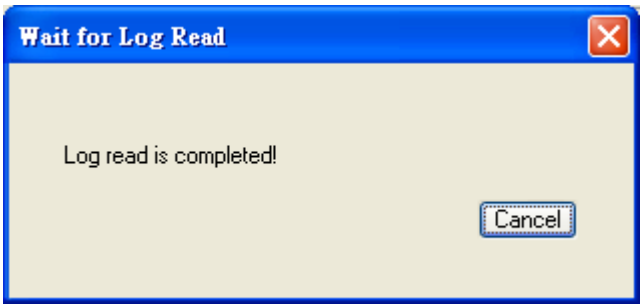
2. Select the to be stored file path and file name. (ex. Data.log)



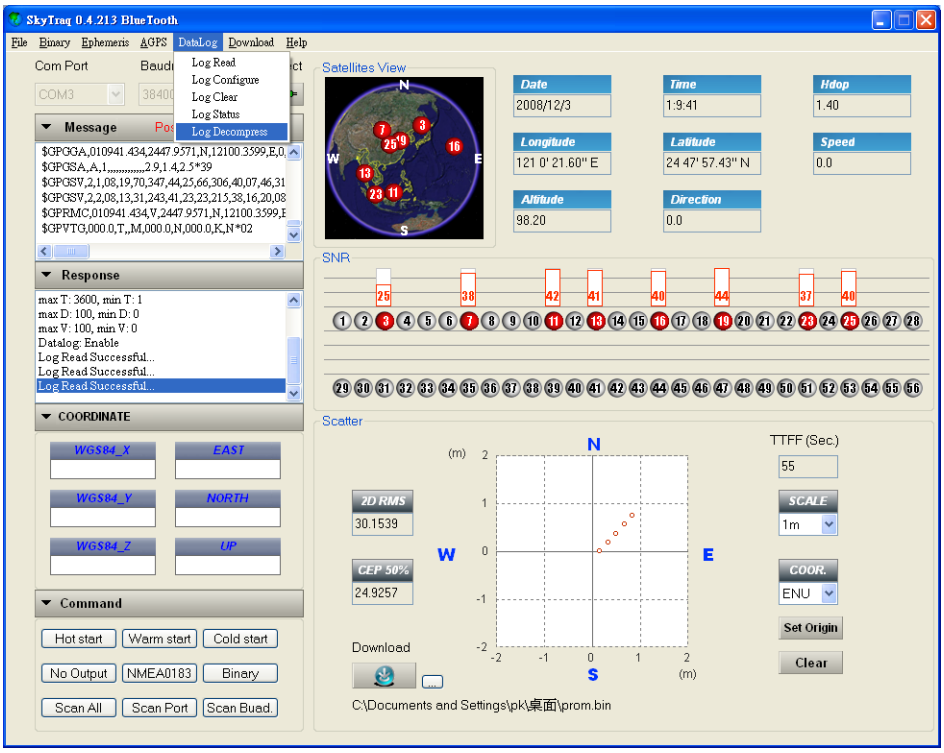
3. Click on the “Store” to retrieve the logged data.



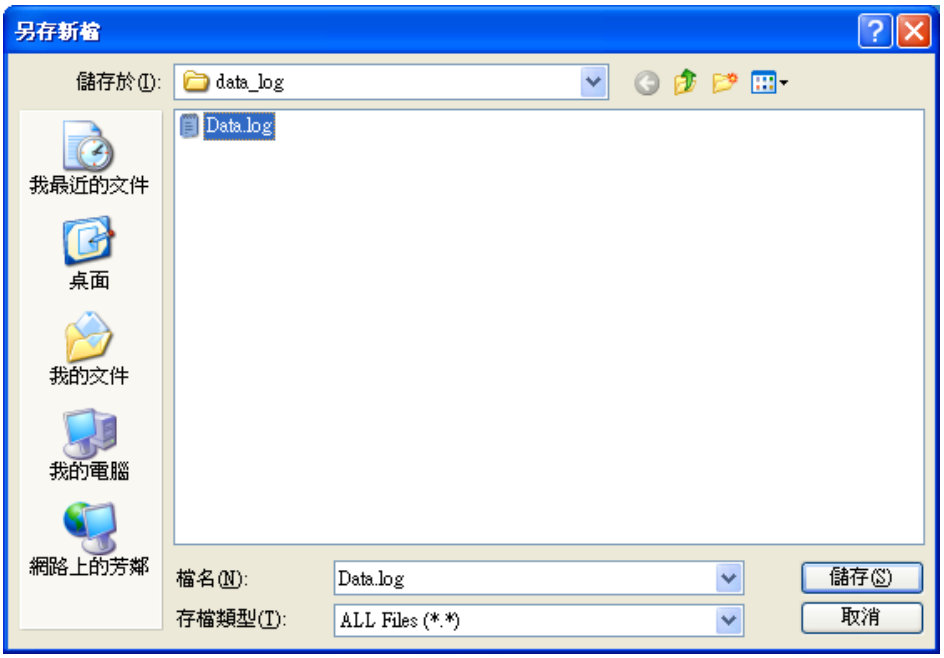
The completed window.



4. Decompress the retrieved logged data by selecting “DataLog→Log Decompress”



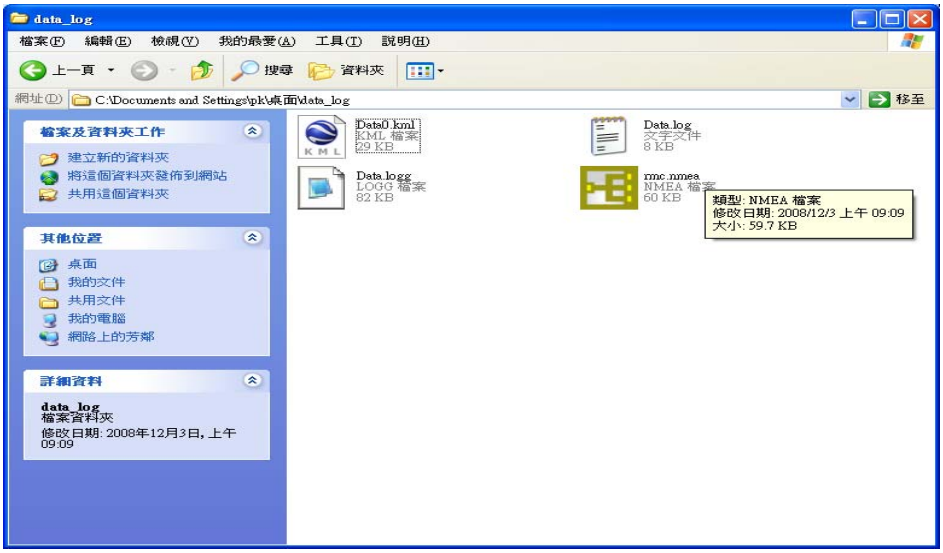
5. Select the pre-stored Data.log (for example).



6. Click on the “Store” to perform the decompression as follows.

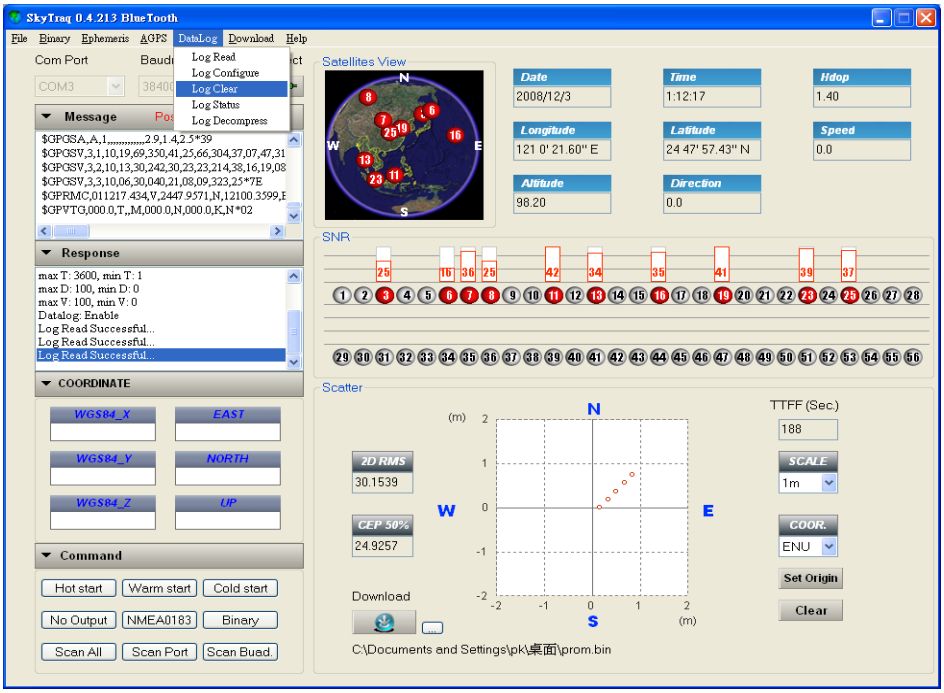
7. After the decompression, some files will be generated as the figure.

The *.kml file can be applied to the Google Earth and display the tracked trace.



8.2.4 Clear the Data Log

1. To clear the logged memory, select “DataLOg→Log Clear”



2. Click “YES” to clear out the whole logged data.

9. Trouble Shooting

◆Satellite signal problem

The following situations are normally if you find the GPS satellite signal is very low or absolute missing:

- ✓ There is something cover above.
- ✓ While you are in a tunnel.
- ✓ Inside of the building.
- ✓ Near by buildings.
- ✓ Put GPS receiver inside the car, some of the sun-control film with metal that makes microwave can not be radiate.

◆GPS not fix problem

If you see “GPS not fix” message on the screen after you enable the UD-731 GPS receiver, please consider the possible problems below:

- ✓ Wait few minutes. GPS position may cost several minutes.
- ✓ Make sure the UD-731 GPS receiver is put on a proper place. Some sun-control film for car may cutoff the satellite signal. You may replace it and try again.

◆ USB driver confliction problem

If you notice mouse cursor is jumping when you plug receiver into USB port, remove the UD-731 from USB port and plug-in again.

10. APPROVED NMEA MESSAGE

The serial interface protocol is based on the National Marine Electronics Association’s NMEA 0183 ASCII interface specification. This standard is fully define in “NMEA 0183, Version 3.01” The standard may be obtained from NMEA, www.nmea.org

10.1 GGA – GLOBAL POSITIONING SYSTEM FIX DATA

Time, position and fix related data for a GPS receiver.

Structure:

$GPGGA,hhmmss.sss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13

Example:

$GPGGA,060932.448,2447.0959,N,12100.5204,E,1,08,1.1,108.7,M,,,,0000*0E<CR><LF>

Field	Name	Example	Description
1	UTC Time	060932.448	UTC of position in hhmmss.sss format, (000000.00 ~ 235959.99)
2	Latitude	2447.0959	Latitude in ddmm.mmmm format ddmm.mmmm Leading zeros transmitted
3	N/S Indicator	N	Latitude hemisphere indicator, ‘N’ = North, ‘S’ = South

4	Longitude	12100.5204	Longitude in dddmm.mmmm format Leading zeros transmitted
5	E/W Indicator	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	GPS quality indicator	1	GPS quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode 3: GPS PPS Mode, fix valid 4: Real Time Kinematic. System used in RTK mode with fixed integers 5: Float RTK. Satellite system used in RTK mode. Floating integers 6: Estimated (dead reckoning) Mode 7: Manual Input Mode 8: Simulator Mode
7	Satellites Used	08	Number of satellites in use, (00 ~ 12)
8	HDOP	1.1	Horizontal dilution of precision, (00.0 ~ 99.9)
9	Altitude	108.7	mean sea level (geoid), (-9999.9 ~ 17999.9)
10	Geoid Separation		Geoid separation in meters according to WGS-84 ellipsoid (-999.9 ~ 9999.9)
11	DGPS Age		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12	DGPS Station ID	0000	Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
13	Checksum	0E	

Note: The checksum field starts with a '*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '$' and '*'.

10.2 GLL - LATITUDE AND LONGITUDE, WITH TIME OF POSITION FIX AND STATUS

Latitude and longitude of current position, time, and status.

Structure:

$GPGLL,ddmm.mmmm,a,dddmm.mmmm,a,hhmmss.sss,A,a*hh<CR><LF>

1 2 3 4 5 6 7 8

Example:

$GPGLL,4250.5589,S,14718.5084,E,092204.999,A,A*2D<CR><LF>

Field	Name	Example	Description
1	Latitude	4250.5589	Latitude in ddmm.mmmm format Leading zeros transmitted
2	N/S Indicator	S	Latitude hemisphere indicator ‘N’ = North ‘S’ = South
3	Longitude	14718.5084	Longitude in dddmm.mmmm format Leading zeros transmitted
4	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
5	UTC Time	092204.999	UTC time in hhmmss.sss format (000000.00 ~ 235959.99)
6	Status	A	Status, ‘A’ = Data valid, ‘V’ = Data not valid
7	Mode Indicator	A	Mode indicator ‘N’ = Data not valid ‘A’ = Autonomous mode ‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input

			mode 'S' = Simulator mode
8	Checksum	2D	

10.3 GSA - GPS DOP AND ACTIVE SATELLITES

GPS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS sentence and DOP values.

Structure:

$GPGSA,A,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x*hh<CR><LF>

1 2 3 3 3 3 3 3 3 3 3 3 3 4 5 6 7

Example:

$GPGSA,A,3,01,20,19,13,,,,,,,,,40.4,24.4,32.2*0A<CR><LF>

Field	Name	Example	Description
1	Mode	A	Mode 'M' = Manual, forced to operate in 2D or 3D mode 'A' = Automatic, allowed to automatically switch 2D/3D
2	Mode	3	Fix type 1 = Fix not available 2 = 2D 3 = 3D
3	Satellite used 1~12	01,20,19,13,,,,,,,,,,	Satellite ID number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	PDOP	40.4	Position dilution of precision (00.0 to 99.9)
5	HDOP	24.4	Horizontal dilution of precision (00.0 to 99.9)
6	VDOP	32.2	Vertical dilution of precision (00.0 to 99.9)
7	Checksum	0A	

10.4 GSV - GPS SATELLITE IN VIEW

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Four satellites details
are transmitted per message. Additional satellite in view information is send in subsequent GSV messages.

Structure:

$GPGSV,x,x,xx,xx,xx,xxx,xx,…,xx,xx,xxx,xx *hh<CR><LF>

1 2 3 4 5 6 7 4 5 6 7 8

Example:

$GPGSV,3,1,09,28,81,225,41,24,66,323,44,20,48,066,43,17,45,336,41*78<CR><LF>

$GPGSV,3,2,09,07,36,321,45,04,36,257,39,11,20,050,41,08,18,208,43*77<CR><LF>

Field	Name	Example	Description
1	Number of message	3	Total number of GSV messages to be transmitted (1-3)
2	Sequence number	1	Sequence number of current GSV message
3	Satellites in view	09	Total number of satellites in view (00 ~ 12)
4	Satellite ID	28	Satellite ID number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	Elevation	81	Satellite elevation in degrees, (00 ~ 90)
6	Azimuth	225	Satellite azimuth angle in degrees, (000 ~ 359)
7	SNR	41	C/No in dB (00 ~ 99) Null when not tracking
8	Checksum	78	

10.5 RMC - RECOMMANDED MINIMUM SPECIFIC GPS/TRANSIT DATA

Time, date, position, course and speed data provided by a GNSS navigation receiver.

Structure:

$GPRMC,hhmmss.sss,A,dddmm.mmmm,a,dddmm.mmmm,a,x.x,x.x,ddmmyy,x.x,a,a*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12 13

Example:

$GPRMC,092204.999,A,4250.5589,S,14718.5084,E,0.00,89.68,211200,,A*25<CR><LF>

Field	Name	Example	Description
1	UTC time	092204.999	UTC time in hhmmss.sss format (000000.00 ~ 235959.999)
2	Status	A	Status 'V' = Navigation receiver warning 'A' = Data Valid
3	Latitude	4250.5589	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N/S indicator N/S	S	Latitude hemisphere indicator 'N' = North 'S' = South
5	Longitude	14718.5084	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
7	Speed over ground	000.0	Speed over ground in knots (000.0 ~ 999.9)
8	Course over ground	000.0	Course over ground in degrees (000.0 ~ 359.9)
9	UTC Date	211200	UTC date of position fix, ddmmyy format
10	Magnetic variation		Magnetic variation in degrees (000.0 ~ 180.0)
11	Magnetic Variation		Magnetic variation direction 'E' = East 'W' = West
12	Mode indicator	A	Mode indicator 'N' = Data not valid 'A' = Autonomous mode

			‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input mode ‘S’ = Simulator mode
13	checksum	25	

10.6 VTG - COURSE OVER GROUND AND GROUND SPEED

The Actual course and speed relative to the ground.

Structure:

GPVTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

1 2 3 4 5 6

Example:

$GPVTG,89.68,T,,M,0.00,N,0.0,K,A*5F<CR><LF>

Field	Name	Example	Description
1	Course	89.68	True course over ground in degrees (000.0 ~ 359.9)
2	Course		Magnetic course over ground in degrees (000.0 ~ 359.9)
3	Speed	0.00	Speed over ground in knots (000.0 ~ 999.9)
4	Speed	0.00	Speed over ground in kilometers per hour (0000.0 ~ 1800.0)
5	Mode	A	Mode indicator ‘N’ = not valid ‘A’ = Autonomous mode ‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input mode ‘S’ = Simulator mode
6	Checksum	5F	

10.7 ZDA -TIME AND DATA

Structure:

$GPRMC,hhmmss.sss,dd,mm.yyyy, , ,xxx<CR><LF>

1 2 3 4 5 6 7

Example:

$GPZDA,104548.04,25,03,2004,,*6C<CR><LF>

Field	Name	Example	Description
1	UTC time	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	UTC time: day	25	UTC time: day (01 ... 31)
3	UTC time: month	03	UTC time: month (01 ... 12)
4	UTC time: year	2004	UTC time: year (4 digit year)
5			Local zone hour Not being output by the receiver (NULL)
6			Local zone minutes Not being output by the receiver (NULL)
7	6C	6C	Checksum

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